



NASA SBIR 2014 Phase I Solicitation

H3.04 Development of Treatment Technologies and Process Monitoring for Water Recovery

Lead Center: JSC

Participating Center(s): ARC, JPL, KSC, MSFC

The capability to recover potable water from wastewater is critical to enable space exploration missions beyond low Earth orbit. A major focus of technology development is to increase reliability of water recovery systems, so these systems require less crew intervention and a lower risk of failure with longer operational lifetimes. With these goals in mind, two areas of interest have been identified for further focus:

- *Water Recovery Post-Processing Systems* - Technologies are needed to increase the reliability of systems for polishing of partially-treated wastewater. The current state of the art uses catalytic oxidation to remove dissolved organic carbon contaminants. Technologies that operate below 100 °C or ambient pressure are desirable. Examples of these technologies include low-temperature catalytic oxidation, photolysis, or photocatalysis.
- *Monitoring Systems for Mineral Species in Water & Wastewater* - A capability is needed to measure dissolved mineral ions in water and wastewater, including polyatomic ions (could encompass organic ions) and the alkaline, alkaline-earth and transition metals. Multi-analyte capability is needed, such as that available from ion chromatography and plasma spectroscopy. Potential applications include measurement of typical ionic species in humidity condensate, potable water, wastewater, byproducts of water treatment such as brines, and biomedical and science samples. Desirable attributes should include minimal sample preparation, minimal consumables, in situ calibration, and operation in microgravity and partial gravity.

At the completion of Phase I, the technology should be TRL 3. The expected deliverable for Phase I is a detailed report describing experimental methods and results, with a clear feasibility demonstration of critical technology components. The equivalent system mass, including consumables, power, volume and mass, should be estimated for the technology and be included in the report. Phase II deliverables should have completed TRL 4 and be approaching TRL 5. The Phase II deliverable should include a prototype system suitable for additional testing at a NASA center as well as a detailed report of testing and development demonstrating TRL 4.